

Upper Ewaso Ngiro River Basin Water Management Information Platform

**Survey on Development Priorities,
Information Needs and Conflict Management Efforts**

Albrecht Ehrensperger

Boniface P. Kiteme



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3 Abbreviations

ASAL	Arid and Semi Arid Land
CAAC	Catchment Area Advisory Committee
CBO	Community Based Organisation
CDE	Centre for Development and Environment (University of Berne, Switzerland)
CETRAD	Centre for Training and Integrated Research in ASAL Development (Nanyuki, Kenya)
ESAPP	Eastern and Southern Africa Partnership Programme
GIS	Geographic Information Systems
ICT	Information and Communication Technology
NGO	Non Governmental Organisation
RWUA	River Water User Association
SDC	Swiss Agency for Development Cooperation
SPSS	Statistic Package for Social Sciences
WAB	Water Advisory Board
WRMA	Water Resource Management Authority
WRUA	Water Resources Users Associations
WSB	Water Service Board
WSP	Water Service Provider
WSRB	Water Supply Regulatory Board
WTF	Water Trust Fund
WUA	Water User Association

4 Acknowledgement

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The survey presented in this report – the initial activity of the E405 project upon which further activities were designed and initiated - was conducted by a team of eight research assistants on the basis of a questionnaire designed by the authors. Mrs Grace Nyaruai, research assistant of CETRAD, supervised the other research assistants, who were:

1. Mrs Edith Gacheri
2. Mrs Jane Simon
3. Mrs Jane Wacuma
4. Mr Felix Gitari
5. Mr Timothy Kimathi
6. Mr Nicholas Mbaya
7. Mr Paul Kariuki
8. Mr Simon Ihuthia

Mr Kariuki and Mr Ihuthia also carried out data entry into SPSS after the survey. Two drivers accompanied and safely transported the survey teams all along the exercise. These were Mr Julius Wahome and Mr Edward Thega.

The GIS team of CETRAD, namely Mr Simon Mumuli, Mr Boniface Mworia and Mr Moses Gone, and the administrator of CETRAD, Ms Jacinta Muchugu, provided conceptual, technical, logistic and administrative support during the survey and during the analysis phase.

The authors wish to thank all the above named persons, as well as all the respondents, who took time to answer the questions asked by the survey teams. This study will certainly contribute to a better understanding of their priorities in terms of regional development and access to information on water use and conservation and will provide a useful basis for the setting up of a water management information platform for the Upper North Ewaso Ngiro Basin.

5 Introduction

5.1 Background

The present report covers the first two activities of the E405 project (survey preparation; survey and data analysis) the aim of which is to come up with relevant information on the development priorities and the need for information on water use and conservation in the study area. This information will, in turn, provide the necessary guidance for the setting up of a water information platform. Additionally, the report contains, at the end, a chapter on policy issues and the legal environment of water management, as well as the role and contribution of River Water User Associations (WUA) towards sustainable use of water resources.

5.2 Aims of the project

The main objective of the E405 project is to provide, at the conceptual and technical levels, the basis for the building up and the sustainable running of a platform aiming at providing adequate information for water related negotiation and decision making processes to different stakeholders in the Upper Ewaso Ngiro Basin. The project explores the institutional requirements necessary to the implementation of such an information platform, assesses the needs of the different stakeholder groups in the basin in terms of water-related information and initiates the preparation of different information tools to be availed to these stakeholders. Through this, the project also aims at enhancing the value and potential uses of the spatial and temporal database of both CETRAD and NRM³. Finally, the project provides fundamental insights into the ways information and Information Technology can contribute to negotiation and decision-making processes in environmental and development contexts.

5.3 Contacts

Additional information is available on **Internet** at the following addresses:

ESAPP: www.cde.unibe.ch

Further inquiries through **e-mail** can be addressed to:

Main contact: CETRAD, Nanyuki: cetrad@cetrad.org

Copy to: Albrecht Ehrensperger: a-ehrensperger@wananchi.com

For inquiries through **phone** please contact:

CETRAD office: +254 (0)62 31 328

6 Survey preparation and set-up

6.1 Aims of the survey

The aim of the survey is to provide a basis for the next project steps, namely the preparation of information tools as a support for sustainable water management and the setting up of a Water Information Platform for the Upper Ewaso Ngiro River Basin. Information about the most urgent priorities in terms of regional development, as well as the most urgent needs for information on water related issues, as perceived by the respondents, is a necessary prerequisite to the implementation of these further project steps.

6.2 Organisation and implementation of the survey

6.2.1 Coordination and logistics

The survey was coordinated by the authors and carried out in July 2003, by a team of 9 research assistants. As a rule, the research assistants carried out interviews in teams of 2, sometimes splitting up for individual interviews. The authors and the coordinating research assistant attended some interviews to get first hand insights into the preoccupations and concerns of the respondents and in order to provide focussed guidance to the survey teams. The teams carried out **227 interviews** in a period of one month.

6.2.2 Questionnaires

The research assistants used two different questionnaires prepared by the authors, one for WUA representatives and another one for other respondents. The first questionnaire includes an additional section (section F) focusing on the activities, achievements and challenges of the WUA. Only 13 interviews were conducted with WUA. At the time when the survey took place, and according to available information, these were all WUA active in the Upper Ewaso Ngiro Basin. They were presented to the research assistants, modified on the basis of their comments and finally tested with several respondents during a two days trial survey.

6.2.3 Research areas and basic spatial units

Five **study areas** were clustered on the basis of their proximity to rivers and their accessibility by road (see map 1 in the annex). Considering the expansive area to be surveyed and the short time at disposition for the implementation of this work, proximity to roads was an important logistic requirement. Five survey regions were delimited:

Region 1: Nyahururu, Rumuruti and surrounding areas

Region 2: Between Nyahururu and Nyeri, as well as Mutara and surrounding areas

Region 3: Naro Moru, Nanyuki and surrounding areas

Region 4: Timau and surrounding areas on the highlands

Region 5: Lowlands including Isiolo and the Archer's Post

Part of the data was spatially analyzed using a Geographic Information System (see maps 1 and 2 in the Annex). The **spatial units** used to carry out this spatial analysis were the sub-locations. Research assistants were therefore instructed to record the place of residence of the respondents, including the name of the sub-location.

6.2.4 Respondents

The respondents targeted were mainly decision makers and opinion leaders (chiefs, teachers, government officials, etc.) as it is anticipated that, at least in parts of the geographic context under consideration, these people are important mediators in conveying any type of information to the communities. In order to record answers having a focus broader than the respondent's own situation, respondents knowledgeable enough about their environment were preferred. The opinion leaders mentioned above tend to match this requirement thanks to their educational background.

The actual **selection of respondents** was carried out in a pragmatic manner: In each area / village / town visited, the research assistants enquired about the availability of representatives of various types of institutions, including schools, local administration, churches, CBOs and others. The first visit would typically be paid to the local chief, in order to receive his/her permission to carry out interviews in his/her area of jurisdiction. If more representatives were available than could be interviewed during the time at disposition, priority was given to respondents representing WUA, as well as government officers, NGOs and CBOs dealing with water related issues.

The research assistants were generally satisfied with the unwinding of the interviews and the participation of the respondents, as they described 141 interviews, out of the total 227, as good, or even excellent. The research assistants thought that only 5 interviews were poor, or poor to medium, while the remaining 61 interviews were considered medium. Though the judgement from the research assistants is purely subjective and therefore certainly varies from one person to another, this overall positive impression from the research assistants is nevertheless encouraging and suggest a genuine interest of the respondents in the topic.

7 Presentation of survey analysis

Below is a presentation of selected analysis results, which are meant to fulfil the following aims:

1. Presenting the respondents (7.1)
This part provides a brief statistical description of the respondents interviewed and of the institutions / organisations they represent.
2. Providing an insight into the main concerns of the respondents (7.2)
The main output of the E405 project is to generate and disseminate information on water use and conservation. This information only is of use in the local context if people think that it might help them in improving their livelihoods. Therefore, the concerns and problems of the respondents have to be known, which was done by means of two ranking exercises.
3. Assessing needs for information on water use and conservation (7.3)
This and the previous part of the analysis will have the most direct impact on the designing of information tools. While the topics to be considered will be assessed from the rankings presented in section 7.2, the form in which and the media through which these contents should be disseminated will be assessed through the results presented in section 7.3.
4. Assessing achievements and challenges of WUA (7.4)
WUA have been established in order to tackle water use and conservation problems in some sub-catchments of the Upper Ewaso Ng'iro Basin. Most WUA have been formed in catchments on the foot-zone of Mt Kenya (Nanyuki river, Likii river, Burguret river, etc.). A few newer WUA have been formed along the Ewaso Narok, Pesi and Mutara rivers on the western side of the Basin. All WUA encounter serious challenges in the running of their affairs and in achieving their goals. The results shown in this section might help in understanding the effectiveness of WUA and hence in providing more focussed support to them.

Selected questions have been illustrated with charts, graphics, or maps and commented for better comprehension. Some elements of interpretation have also been provided where deemed useful. These elements of interpretation have to be understood as suggestions and are therefore merely a basis for further discussion.

The philosophy of the E405 project is one of free information sharing between stakeholders concerned with sustainable water use in the Upper Ewaso Ng'iro Basin. Henceforth, the project team will try to assist any interested stakeholders in conducting further analysis on the basis of the survey data (see attached questionnaire), if specific analysis will be relevant to them. Data will also be shared openly, with the usual restrictions to protect the anonymity of the respondents.

7.1 Background of respondents

This section provides a quick statistical overview of the respondents interviewed and the institutions (if any) they represent.

7.1.1 Knowledge about the research area

Respondents with sufficient knowledge about the research area were sought with use of three variables: The period of residence of a person in the area, the age of that person and the person's educational background. The duration of a person's **residency** is an indicator for the degree to which this person identifies and is conversant with a geographic context. Some of the respondents moved into the research area a long time ago, or were born there, others have arrived recently (some of them in 2003). In average however, the respondents had stayed in the research areas for 20 years and were therefore sufficiently conversant with it.

Three quarters of the respondents were **aged** between 30 and 50 and therefore probably quite aware about current development issues concerning the region. While elderly people might have added a valuable historical dimension and temporal dynamism to the research results, their probable lack of exposure to modern means of information dissemination (ICT) would have put into shade important indications necessary to the designing of water information tools. Furthermore, the survey focused on opinions about the present rather than past situations.

Finally, 80% of the respondents had completed secondary **education** or higher (secondary school, colleges, university) and were consequently people with the ability to identify with and understand information disseminated in different forms and through different media. As such, they certainly do not reflect the overall educational level within the research area and the conclusions drawn from the survey analysis will mainly provide clues on ways to exchange information between a water information platform and individuals, or institutions being able to act as mediators with the communities.

Gender would have been an important aspect of the knowledge and the perception of a particular area. Unfortunately, there is a severe bias towards male respondents (199 men and 28 women). This is largely due to the fact that, in the research area, incumbents of decision-making positions (the type of respondents the study was aiming at) are very often men. Though this bias is regrettable, trying to avoid it would have led to other complications, especially for the research assistants and would possibly have introduced other biases and complications.

7.1.2 Spatial representation

As a next criterion, equal representation (20% each) was sought between the five **survey regions** (see map 1 in the annex). Livelihood strategies vary greatly between the high potential areas in the upper stretches and the arid plains in the lower stretches of the basin (see photos 1 and 2) and the survey tried to capture opinions from respondents relying on, or confronted with these different livelihood strategies. This aim was achieved to a large extent: Region 1 scores highest with 22.5% of all interviews conducted there. Regions 2 and 5 are both represented with 17.6% of all interviews conducted in each of them. About 20% of all interviews were conducted in region 3 and about as much in region 4.

At **sub-locations** level no equitable representation was aimed at. In the 79 visited sub-locations, the number of respondents per sub-location varies between 11 (two cases) and 1 (28 cases), with around 65% of the sub-locations covered by only one or two interviews. Consequently, caution must be applied when interpreting the maps in the annex: **There is no correlation between the size of a sub-location and the number of respondents interviewed in this sub-location.** On the contrary: Larger numbers of respondents were interviewed in urban centres (Nanyuki, Naro Moru, Nyahururu, Isiolo, etc.), which are typically located within relatively small sub-locations. The analysis of the maps has therefore to be conducted in a 'qualitative manner' by looking at the overall spatial distribution of the ranked development priorities, rather than by attempting to conduct a quantitative analysis based on the extents of sub-locations.

7.1.3 Knowledge about water issues

Finally, there is a voluntary bias towards **respondents with a particular interest in water related issues**, in order to access informed opinion about these issues, rather than individual concerns of respondents not familiar with more complex water management issues. Information was sought from professionals, as for example hydrologists, working in water resources departments, project coordinators dealing with water resource management and people engaging in various forms of irrigation. Consequently, about one quarter of all respondents is at the same time members of WUA, but most of these (32 out of 48 cases, in which the information was available) have been members for not more than two years. This is not surprising, considering the fact that most WUA are relatively new organisations.

Photo 1: High potential area: Wheat fields near Nyahururu on the western side of the Ewaso Ngiro Basin (A. Ehrensperger, 2003)



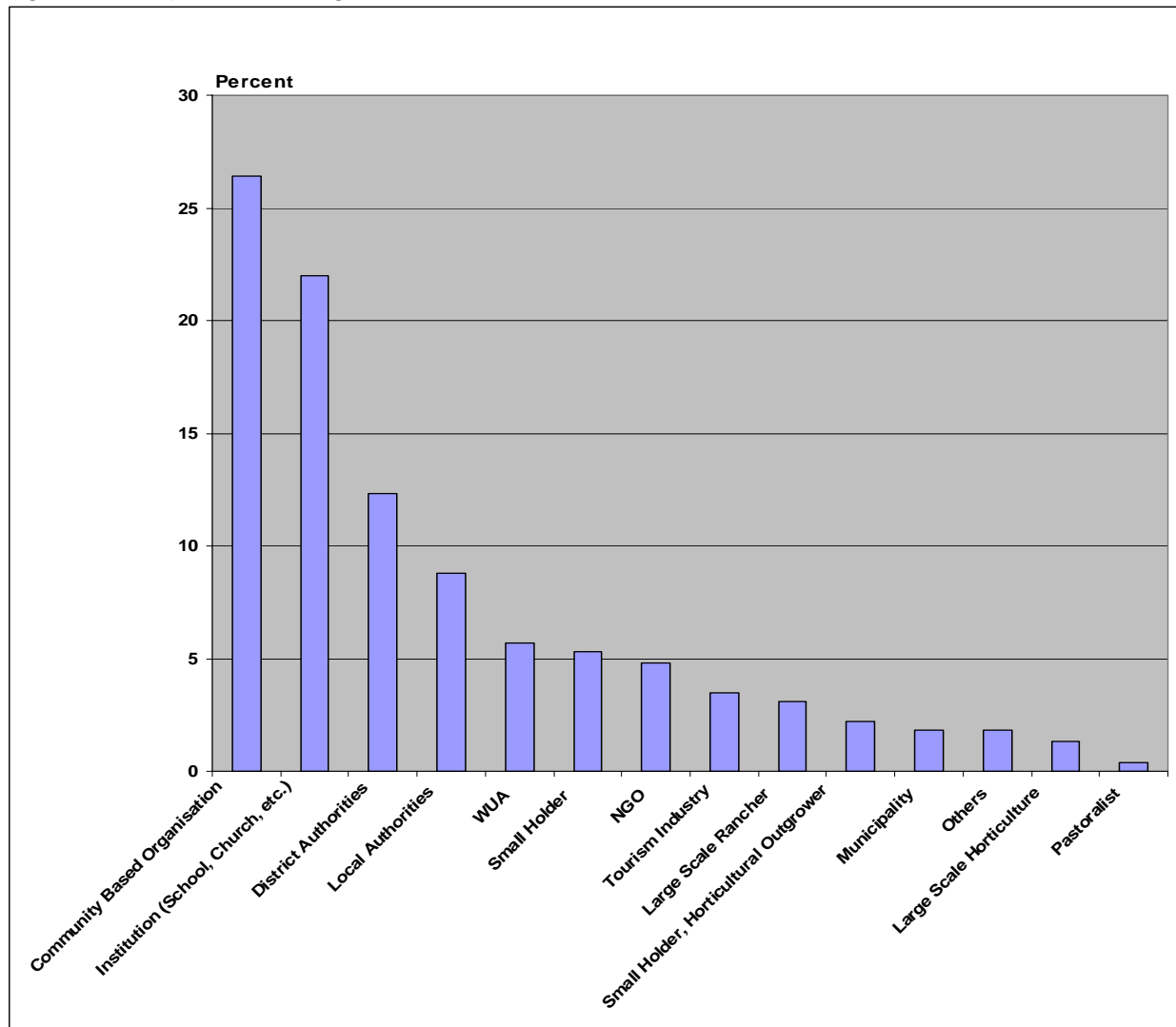
Photo 2: Low potential area: Homestead in the semi arid Laikipia Plains in the central part of the Basin (A. Ehrensperger, 2003)



7.1.4 Respondent categories and profession

Figure 1 below clearly outlines the focus of the study onto **opinion leaders**, rather than “grass-root” respondents. It was felt that community based organisations (CBO), as well as institutions such as churches and schools, through the nature of their work, probably ideally combine awareness about local to regional issues and knowledge about individual problems in their areas of operation. This makes them ideal vectors of information between information centres and the community. Some of them already play mediating roles for different purposes, for example in the frame of extension services, as teachers, or priests.

Figure 1: Respondent categories



Source: Field Data, 2003

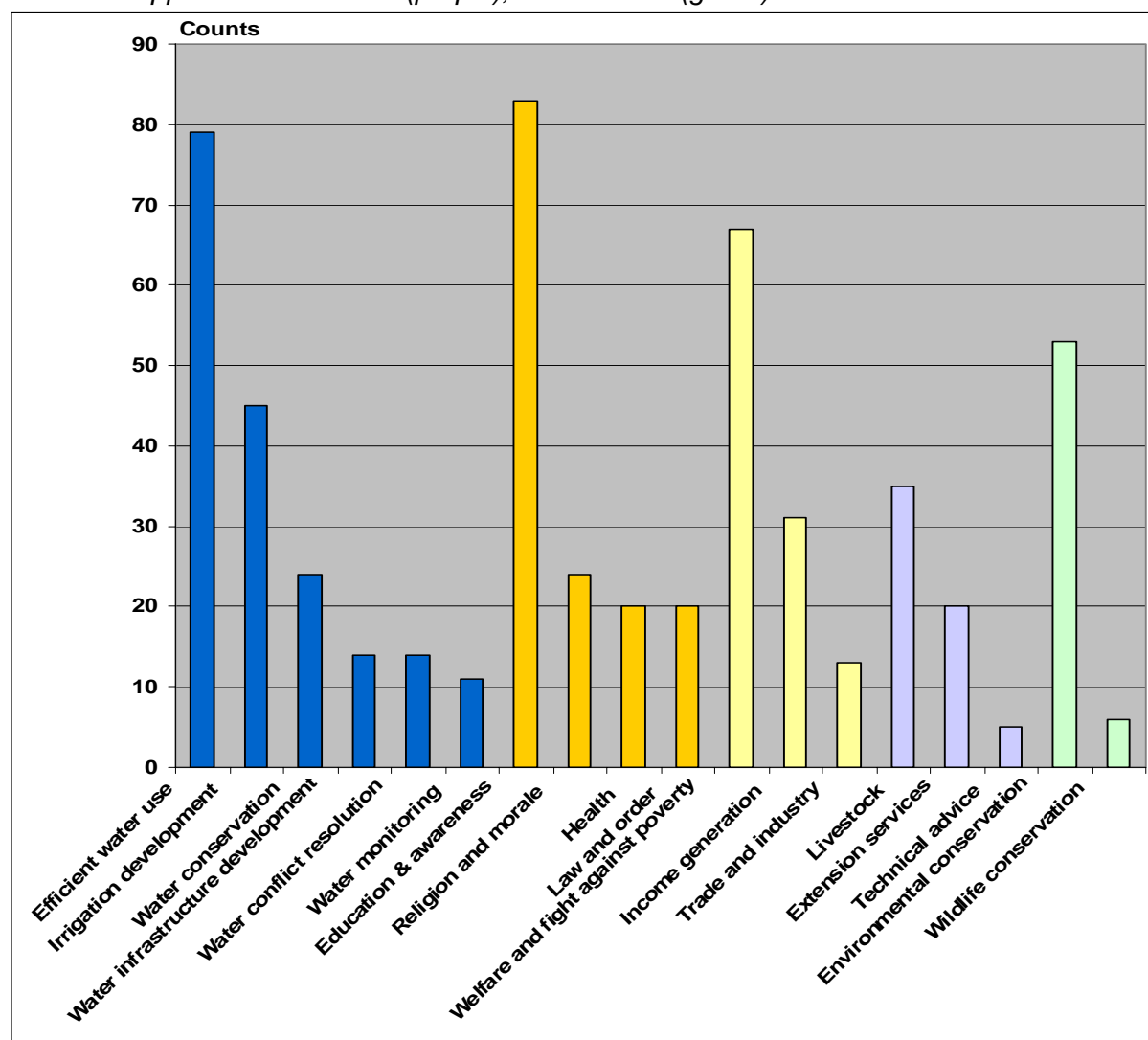
Among women, the largest professional group (11 persons) is farmers, followed by teachers (9 persons) and social workers (3 persons). Among men, the largest professional group is farmers as well (49 persons), followed by administrators and teachers (36 persons each) and hydrologists (10 persons). The farmers interviewed (both male and female) were often CBO representatives. Out of 56 CBO representatives, 39 indicated farming as their primary activity. Unfortunately, no balance could be achieved between farmers and pastoralists, maybe because the latter are not as well represented in decision-making positions (which were targeted by the survey). A cross-tabulation between the survey regions and the professional background of the respondents shows that in region 5, which is predominantly pastoral, the survey teams concentrated on administration personnel of local and district authorities, a bias which might have originated in the difficulties encountered in trying to conduct interviews with pastoralists, or in the research assistants' own backgrounds, sympathies and perceptions.

7.1.5 Main objectives of institutions

The main objectives and concerns of the institutions represented by the respondents fall into 5 groups (in brackets the colours of the bars in figure 2): Water related issues (blue); public services (orange); economy and finances (yellow); technical support and extension (purple); environment (green).

It was mentioned previously that respondents dealing on a professional basis with water issues were sought wherever available. This bias is reflected in figure 2, the water related issues being the strongest group. In this first group, most institutions deal with water use rather than conservation and the development of irrigation takes in a crucial position. The need to increase and to improve irrigation systems was often mentioned as a high priority to help farmers to cope with erratic rainfalls. Irrigation, however, plays a controversial role in terms of sustainable management of natural resources due to its high water consumption and the rapid expansion of this type of agriculture in some parts of the basin. Classic conflicts over water allocation between upstream and downstream areas are likely to occur at an increased rate hand in hand with the increase in irrigation practices. Public service includes mainly teachers, priests, healthcare personnel and local authorities, while economy and finances, but also technical support and environment are probably more the concern of NGOs, CBOs and extension services.

Figure 2: Main objectives of the institutions represented by the respondents grouped into 5 categories: water related issues (blue), public service (orange), economic development (yellow), technical support and extension (purple), environment (green).



Source: Field Data, 2003

7.2 Regional development and water related priorities

This section presents the priorities of respondents in terms of important development issues affecting their region. The aim is to find out whether water related issues are really an important priority in the perception of the respondents and also to find out which aspects of water use and conservation are particularly problematic. The two sections 7.2.1 and 7.2.2 try to formulate some answers towards these questions. The priorities of the respondents in terms of both regional development issues and water related issues were captured through two separate ranking exercises. The respondents were asked to rank these issues according to priority and on the basis of their own perception. It is however possible, that some of them included opinions and values propagated by the institutions they work for. The respondents were first given a series of cards with, on each of them, a particular regional development topic. The series included:

Land subdivision; Land tenure; Population pressure; Resource use conflicts; Crime and security; Water use; Water conservation; Food security; Poverty; Soil erosion; Health; Education; Economic Situation; Unemployment; Forest conservation.

The respondents were asked to place the cards in order of priority and were then encouraged to slot-in other important topics and to position them within the ranking they had just done. In the next exercise, the respondents were given another series of cards, with topics related to water use and conservation. This series included:

Bad water quality; Not enough water; Water shortages in some months; People are not ready to share the water; Too many people want to use water; Some users are not following the water laws; Authorities are not able to solve water problems; Community is not able to solve water problems; Bad water infrastructure; Not enough information on water.

Again, the respondents were asked to rank the cards in order of priority and to slot-in other important topics.

7.2.1 Development priorities

Table 1 shows the average and classified ranks of each development issue, rank 1 being the highest and rank 19 being the lowest one. The second column shows how many respondents included the development issues in the ranking. The 15 predefined issues have been included in most cases (max. 224 – min. 218), though few respondents refused to rank some of these issues, saying that they were not relevant for their area of residence. The additional issues, which were not on the card series (rows with orange background), have been identified by a variable number of respondents. Some respondents might simply not have thought about these issues during the interview. Nevertheless, it is worth noting that “infrastructure” was spontaneously identified by 152 respondents and seems therefore to be an issue of great concern. The averages (third column) are calculated using the number of answers received, not the total number of respondents, and the ranks (fourth column) are directly derived from the averages. Human – wildlife conflicts, for example, which ranks third, has been identified as a priority by 59 respondents. The average for this issue was calculated by summing up all ranks given and dividing the total by 59. In light of this evaluation method, the additional topics (orange background) have to be dealt with cautiously, as they reflect the views of part of the respondents only. Livestock, for example seems to be an important issue to a limited number of respondents only.

The weights shown in the fifth column were calculated as follows: $[(1/(\text{average}^3)) * 15,000]$. This self-designed ad-hoc formula aims at inverting the averages and stretching them between 0 and 100, in order to identify significant gaps between groups of values. Three clusters, separated by two red lines were identified: The first two issues (**poverty and water use**) seem to be on an almost unanimous basis the “top scorers” among all topics identified. The ten following issues could be referred to as “serious but not critical”, while the remaining 7, below the second red line, are probably of little concern to the respondents.

Table 1: Ranking of development concerns

Development issue	Nr of answers	Average	Rank	Weight
Poverty	224	5.36	1	97
Water Use	223	5.48	2	91
Human – wildlife conflicts	59	6.10	3	66
Water conservation	224	6.40	4	57
Infrastructure	152	6.72	5	49
Livestock	28	6.96	6	44
Unemployment	223	7.07	7	42
Food security	222	7.15	8	41
Health	222	7.16	9	41
Education	220	7.54	10	35
Access to markets	45	7.62	11	34
Economic situation	221	7.74	12	32
Crime and security	221	8.91	13	21
Forest protection	222	9.17	14	19
Resource use conflicts	222	9.91	15	15
Erosion	219	11.27	16	10
Land tenure	220	12.17	17	8
Population pressure	219	12.30	18	8
Land subdivision	218	13.86	19	6

Source: Field Data, 2003

Regardless of whether one looks at the rank or the weight, includes or disregards the additional issues, water use and conservation (blue background) seem to be of utmost importance. Discussions with professionals knowledgeable of the Upper Ewaso Ngiro Basin confirm these results. Water is indeed a burning issue and one that has already led to severe conflicts between different communities, individuals, or even between humans and the wildlife. Having this in mind, it might be interesting to assess possible spatial patterns reflected by this ranking. An attempt at finding out such spatial patterns is presented in the **annex: Map 2** shows, for each sub-location, in which interviews were conducted, the development issue which obtained the highest rank in the average of all rankings done in this sub-location (blank areas were not covered during the survey). The issues have been grouped into 5 broad categories and each of them was assigned a different background colour (see legend of the map):

- | | |
|-------------------------------|--------|
| 1. Water use and conservation | blue |
| 2. Public service | red |
| 3. Economy | yellow |
| 4. Environment | green |
| 5. Policy and legislation | black |

While categories like economy, or policy and legislation do not reveal any particular spatial pattern, the three other categories' spatial distributions are worth a few comments:

Two main clusters can be identified on the map: A first cluster delimited with a black line contains sub-locations in which the highest rank was mainly obtained by issues pertaining to water and the environment (water use, water conservation, forest protection, wildlife). As these are predominantly upstream areas enjoying higher rainfall and easier access to water, the bigger concern for water related issues can only be explained with the fact that most upstream communities rely on farming for their livelihood and therefore depend to a higher degree on stable water supply than pastoral communities, which rely on their own and their livestock's mobility in order to cope with erratic rainfalls and a semi-arid environment. Farmers are also more vulnerable to incursions from the wildlife (e.g. crop raiding by elephants), reason for which human-wildlife conflicts yielded top scores in the upper stretches of the basin. The second cluster (red line) contains parts of the drier and somehow more remote areas of the Laikipia highlands. In these areas, where one would

have expected to find water related issues at the top of the stakeholders' preoccupations, it is rather issues regarding public service (education, health, infrastructure, market accessibility and security), which are dominant. This can be interpreted as an indication that the general feeling in these areas is probably one of being marginalized and left out of the overall development processes by the authorities and development agencies.

7.2.2 Priorities for water use and conservation

Table 2 shows the ranking of water related issues. As in Table 1, rows with orange background contain issues, which were added by the respondents themselves. The ad-hoc formula used to stretch the weights between 0 and 100 had to be adapted to the values of the averages obtained: $[(1/\text{average}^4) \cdot 12000]$. As in the previous ranking, there is not particular mathematical significance in this formula, its only aim being to achieve the best possible stretch between 0 and 100.

The huge gap between the weight of the first issue and the next ones is striking. Water quantity really is the main concern of the respondents. The second and third issues, which have a medium weight, also pertain to insufficient water quantity. Hence, the aspect of quantitative availability of water takes in a dominant position as opposed to, for example, water quality, information on water, or water conservation issues. It is interesting to note that though population pressure ranked second last in the development priorities (see above) the respondents are aware of an ever increasing demand for water, due to constant immigration. One wonders at the reasons for the discrepancy between the two rankings. Probably, the respondents have been able to only partly conceptualise the consequences of increased immigration on the use of natural resources.

Table 2: Ranking on water use and management concerns

Water related issue	Nr of answers	Average	Rank	Weight
Not enough water	224	3.33	1	98
Water shortages in some months	225	4.12	2	42
Too many people want to use water	222	4.73	3	24
Need for catchment protection	27	5.63	4	12
Bad water infrastructure	223	5.68	5	12
Not enough information on water	223	5.72	6	11
Lack of water policy	22	5.82	7	10
Some users do not follow the law	221	5.94	8	10
Authorities are unable to solve problems	221	6.16	9	8
Community is unable to solve problems	222	6.29	10	8
Bad water quality	222	6.64	11	6
People are not ready to share water	220	7.34	12	4
Lack of community involvement	5	7.60	13	4

Source: Field Data, 2003

A policy, which would either drastically increase the quantity of available water, or drastically reduce the number of people asking for this commodity is rather unrealistic (even if a strong family planning policy were put in place). Hence, one is tempted to shift attention to the next three issues (catchment protection, water infrastructure and information on water), in search of applicable solutions leading to improved water conservation. As a matter of fact, these issues bear some potential for enhancing sustainable water use. **Catchment protection** and the positive impact it has on water conservation and environmental protection at large is obvious. It would, to a certain extent, also improve water availability through its regulative effects on surface run-off. Improvement of **water infrastructure**, especially the construction of small dams to avail water during the dry spell, or the improvement of irrigation techniques (drip irrigation) would also enhance water availability. **Information on water** finally, would help to create awareness about the necessity for water conservation and the interdependence between all parts of the basin in terms of water management. As Wiesmann (1998) suggests, the availing and the dissemination of information on water related issues will have to become part of a broader development strategy for sustainable development. A well defined operation framework, within which the planned Water Informa-

tion Platform will have to operate, will be concretised from previous conceptual inputs, as for example the ones of the aforementioned author.

7.2.3 Conclusions

The combination of the results from both ranking exercises, leads to the following conclusions:

1. There is a difference in the way development and water related priorities are perceived between the upper and the lower stretches of the Ewaso Ngiro Basin.
2. This difference can be explained with the predominant livelihood systems pursued in either area and with the population density gradient between the high potential areas and the low potential areas.
3. Concerns about the quantitative availability of water, efficient water infrastructure and the stiffening competition over water resources go hand in hand with the prevalence of small and large scale irrigation farming, horticulture, urban lifestyle and strong immigration.
4. Pastoral use and large scale ranching are more robust towards environmental variability and therefore direct their main development concerns onto different aspects of social, economic and cultural marginalisation.
5. There is a problem of water pollution in the rivers originating from the Aberdares range, while this problem seems to be less urgent in the case of Mount Kenya. Further empirical evidence is required in order to verify this preliminary conclusion.

These few, generalized and non-exhaustive conclusions can be of help in formulating preliminary recommendations for the improvement of the overall development situation and the enhancement of sustainable use of water resources in the Upper Ewaso Ngiro Basin. Below is an attempt at defining such recommendations, which will be of help in identifying some of the aspects for a future information system focussing on water use and conservation issues:

Recommendations for the upper reaches

1. Availing economic alternatives to farming in the secondary and tertiary sectors in order to alleviate pressure on water resources caused by predominance of agricultural practices.
2. Enhancing efficiency of urban, domestic and industrial water use through appropriate water distribution concepts, infrastructure maintenance, tapping of alternative sources (e.g. roof water harvesting) and awareness creation.
3. Enhancing water use efficiency in small-scale farming and horticulture through the introduction of new technologies like drip-irrigation and the storage of water in small-scale dams.
4. Collaborating with neighbouring districts in order to control population dynamics and manage migratory movements, e.g. through regulating land subdivision and new settlements.

Recommendations for the lower reaches

1. Integrating these areas into the overall development processes of the region / districts through reduction of social, economic and cultural marginalization.
2. Providing favourable conditions for pastoral use, encouraging the adoption of standards for livestock products and opening access to markets
3. Availing economic alternatives in the secondary and tertiary sectors.

Recommendations for both areas

1. Come up with a coherent water use policy for the entire basin.
2. Streamlining the roles and functions of the regional development authorities.
3. Create awareness about sustainable use of water resources and the interdependence of all parts of the Upper Ewaso Ngiro Basin in this respect.

7.3 Need for information on water use and/or conservation

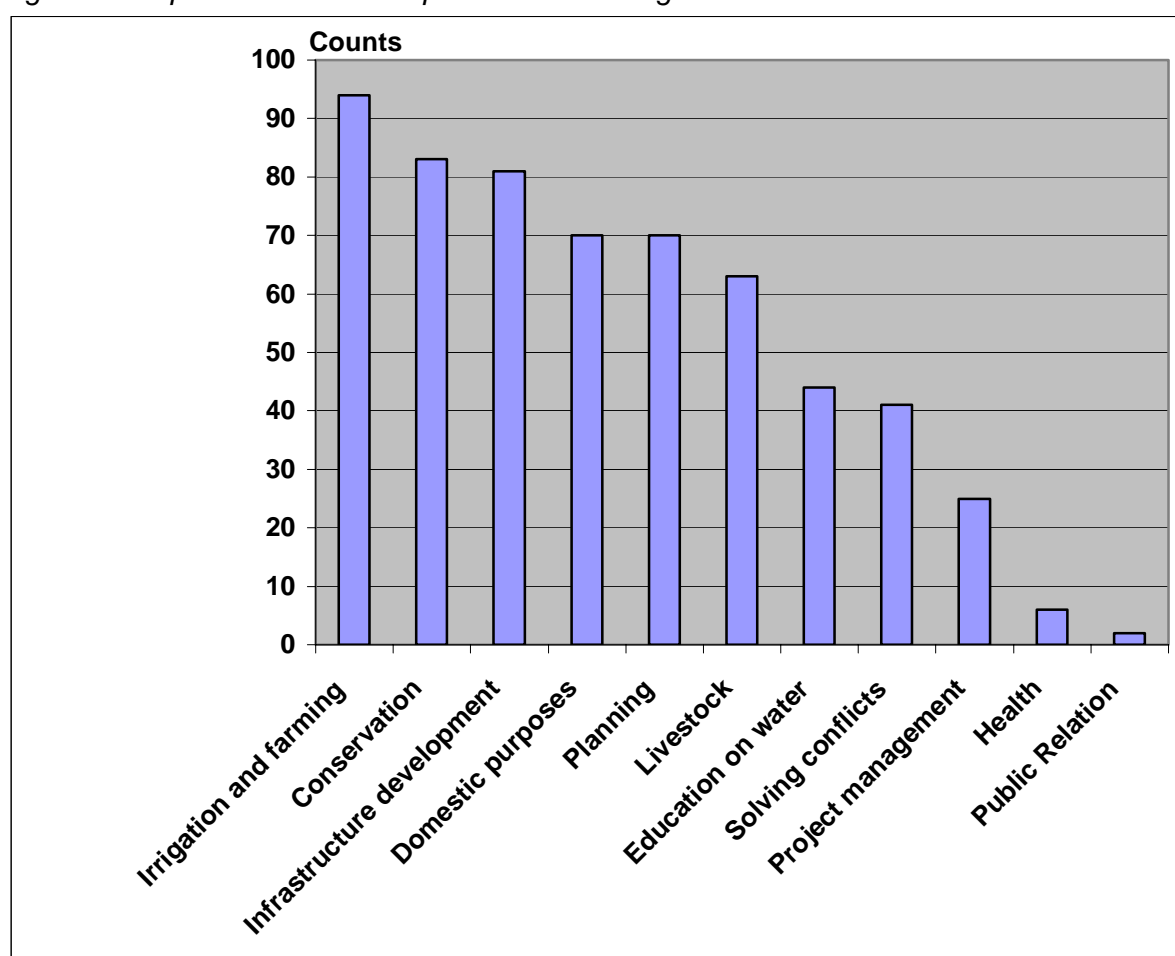
7.3.1 Accessing information

A vast majority of respondents (88%) claim having at least once actively sought information on water conservation and/or use. Almost as many claim using that information in the frame of their professional and/or private activities, 56% of them on a daily basis. These indications demonstrate a real demand for information on water use and conservation.

Most of the respondents use the information for their own benefit, in their farming / livestock activities, in developing infrastructure and in running domestic affairs (figure 3). However, environment conservation is also an activity for which information on water is frequently requested. As could have been anticipated awareness creation, which in the graph below is probably best represented by “education on water”, does not yield very high scores. If awareness is not present, then the notion about the necessity for awareness creation can not be present as well.

The proposed water information platform will have to concentrate on **conservation issues, planning and awareness creation** in order to meet its objectives. Those three information components yielded almost 200 counts, which amply justifies putting them at the centre of the information platform, whereas a technical guidebook for individual water infrastructure development would certainly be a wrong approach and one that would pre-empt efforts and services provided by extension workers.

Figure 3: Purposes for which respondents are using information on water related issues

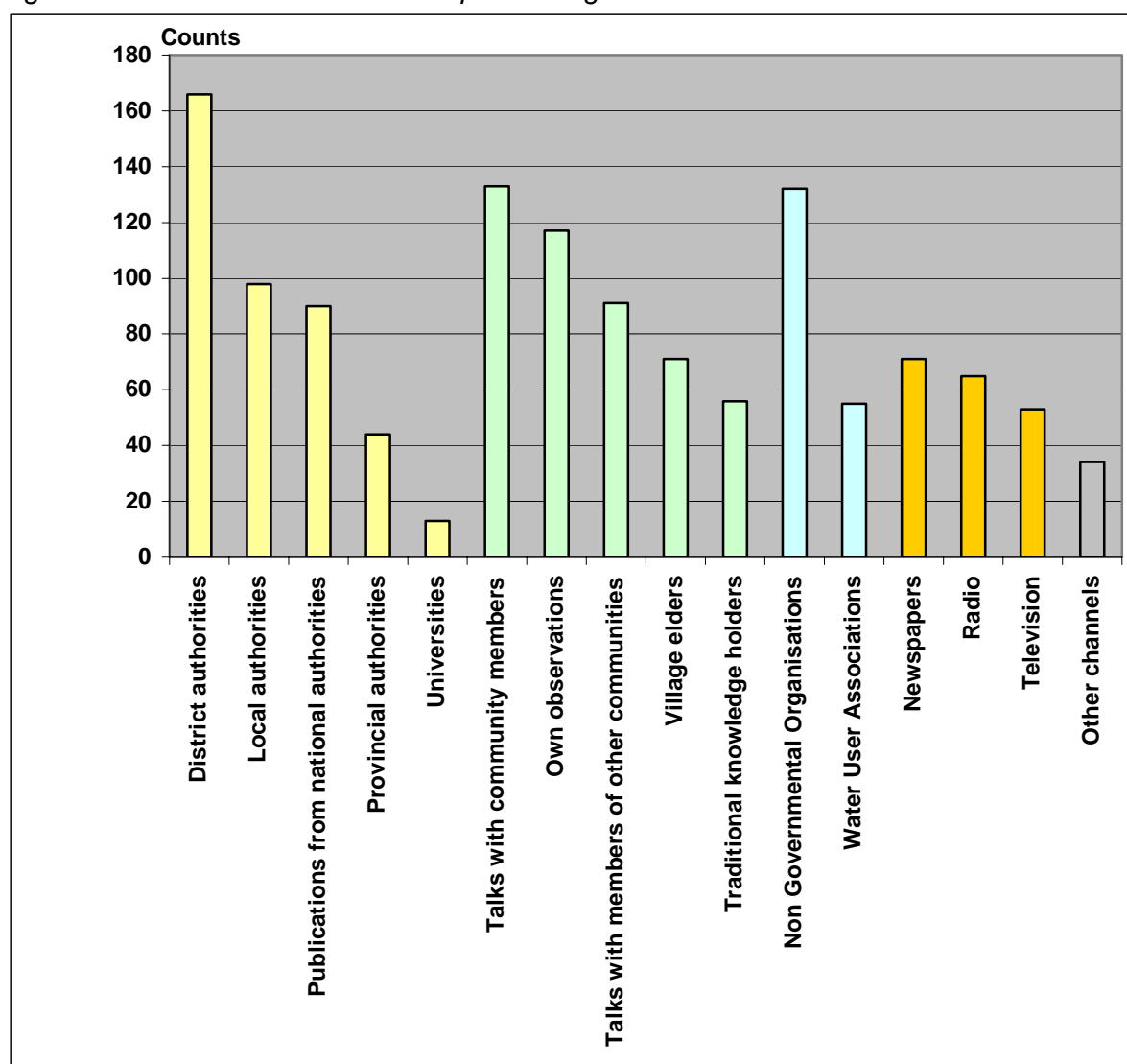


Source: Field Data, 2003

Figure 4 below shows from which sources the respondents get their information on water use and conservation. The sources have been grouped into 5 categories: governmental institutions (yellow), community (green), public and private institutions (blue), media (orange) and others (grey). The authorities and the community are clearly the most consulted categories. Individual sources which are often consulted are the district authorities, community members and NGOs. When selecting mediators to convey information on water issues to the communities, these preferences will have to be taken into consideration.

The **WUA** do not yet play a significant role as conveyors and mediators of information regarding water use and conservation. Despite of this, they will have to be considered as mediators for the information generated in the frame of the water information platform, primarily because of their thematic focus, but also because of their catchment approach, which when it comes to water provides a better basis for planning than the arbitrarily drawn administrative boundaries (The Likii River Sub-Catchment for example belongs to 3 different Districts: Meru Central, Laikipia and Nyeri). The districts authorities, NGOs and members of the communities – all three having achieved high scores – will probably also play a key role as mediators for the information to be disseminated through the water information platform.

Figure 4: Sources from which the respondents get information on water issues



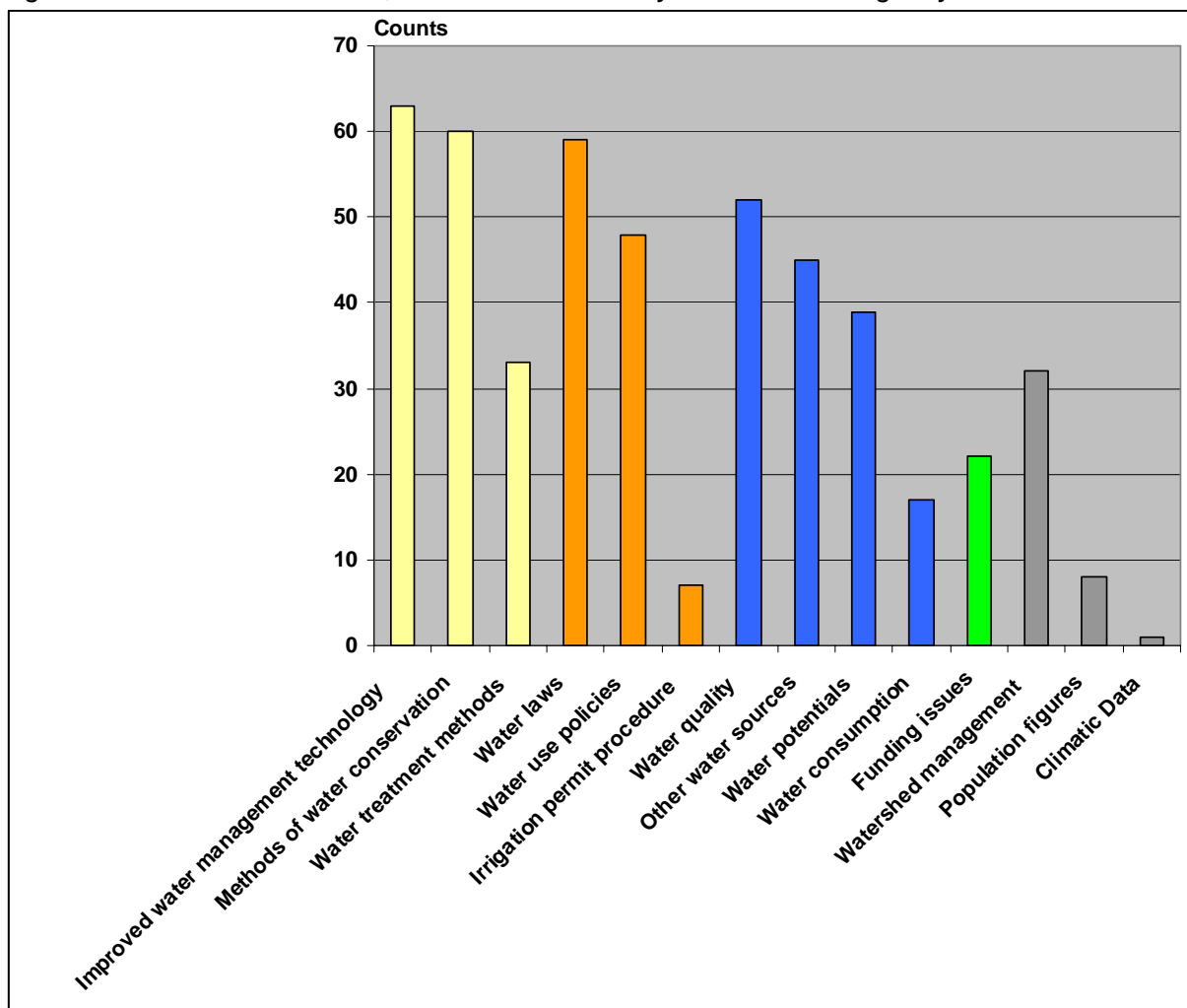
Source: Field Data, 2003

While it was interesting to assess which currently available information was accessed by the respondents, it is also necessary to inquire about the information they would have wanted to have,

but can not currently access. The results from this enquiry are shown in figure 5. The information required was classified into 5 groups: The first group (yellow bars) concerns technical questions, the second group (orange bars) pertains to legal issues, the third group (blue bars) addresses existing water resources, the fourth group (green bar) concerns funding issues and the fifth group (grey bars) contains other issues. The respondents were completely free in identifying these issues and no prior classification was suggested to them.

Technical issues and information on existing water resources lead with 155 counts each. The legal aspects follow in third position (115 counts), while the two other groups are marginal. Technical aspects will not feature prominently in the information platform, but the information on existing water resources will certainly be at the centre of it, especially information on water potential and water consumption. Therefore, the information to be provided with the water platform covers at least part of an actually existing need, a further justification for its being put into place.

Figure 5: Information on water, which is not currently available but urgently needed



Source: Field Data, 2003

7.3.2 Improving information

Hereafter, are a few remarks on the improvements that need to be done on the way water related information is prepared and communicated to those who need it. The respondents were asked to rank six different strategies through which the relevance of water related information could be increased. The results are displayed in Table 3. The wish to have easier access to information clearly outdistances the other strategies. More understandable and timelier information rate second and third, but have almost equal averages. The other strategies follow behind, and the small standard deviation of the last ranked option, clearly shows, that the respondents do not really en-

visage other improvements than the ones listed in the questionnaire. One could summarize the situation as follows: Information on water issues is not commonly available to the people in the Upper Ewaso Ngiro Basin and when it is needed it is difficult to find. When one finally gets that information, it quickly appears that it has not been prepared for consumption by non-specialists and that it is outdated.

Table 3: Wishes pertaining to the improvement of information on water issues

Improvement strategy	Rank	Average	Standard Deviation
Make information easier to access	1	2.40	1.50
Make information easier to understand	2	3.06	1.62
Make information available in time	3	3.07	1.58
Make information more concrete	4	3.43	1.64
Make information more reliable	5	4.00	1.46
Other improvements	6	5.98	0.27

Source: Field Data, 2003

What could be the contribution of a water information platform to improve the above described situation? Information and Communication Technology (ICT) and GIS allow for fast and easier generation and dissemination of information, and might therefore contribute to facilitate access by various stakeholders to recent and therefore to more relevant information. Graphic and modelling capabilities of ICT might also help in generating information that is more graphical and therefore more intuitively understandable. These potentials, however, are not yet known and therefore not yet valued by the respondents, as they identified traditional dissemination strategies as the most promising. Table 4 clearly shows that barazas – debates and discussion during gatherings – are the preferred form of information dissemination. Direct contact with specialists who can avail specific – mostly technical – information follows in second position and visually prepared media for information dissemination, as for example photography and movies registered an astonishing third rank. Written material scored significantly lower and modern information technology came last, only preceding the distribution of fliers and circulars, which had been identified as an alternative solution by a few respondents.

Table 4: Preferred information dissemination strategies

Dissemination strategy	Rank	Average	Standard Deviation
Barazas (meetings, debates)	1	1.31	0.74
Contact with specialists	2	2.88	1.71
Movies, photographs	3	3.35	1.43
Reports	4	4.00	1.54
Maps	5	4.07	1.32
Newspapers	6	4.76	1.81
Statistics	7	5.28	1.72
Computer models and simulations	8	6.75	1.69
Circulars, fliers	9	7.00	3.46

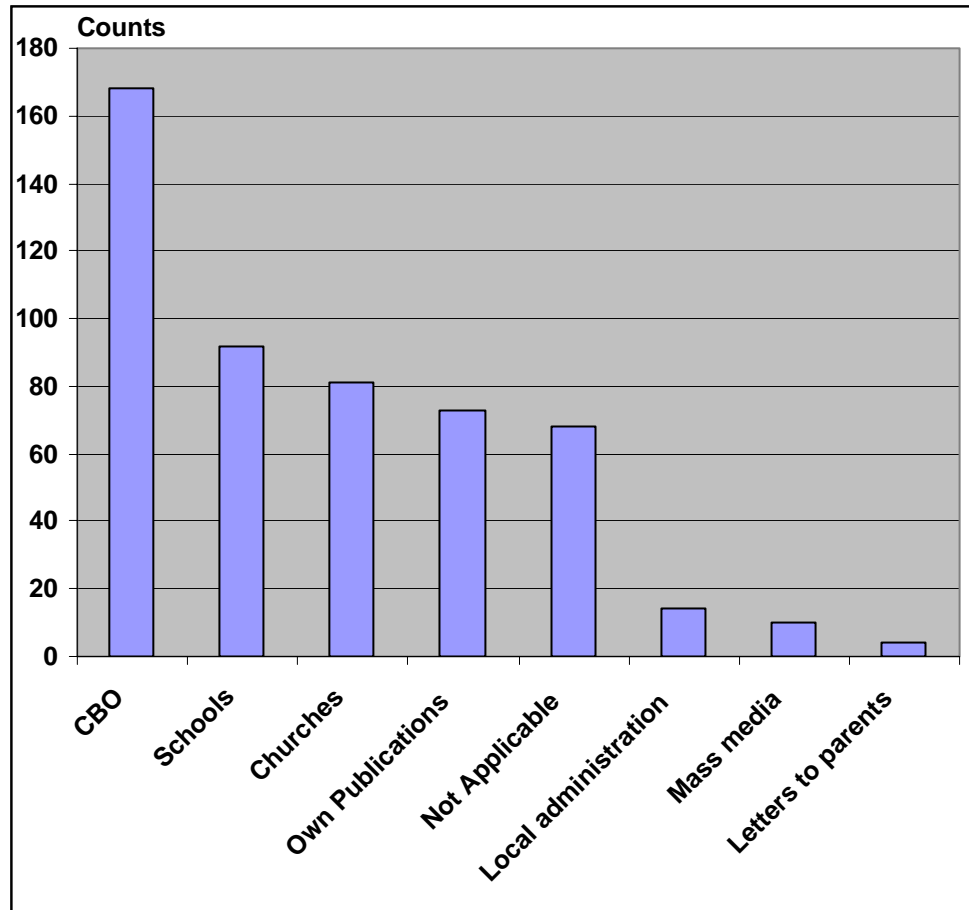
Source: Field Data, 2003

There seems to be a slow change of perception, among the younger generation, about the possibilities offered by ICT and more specifically computer models in helping to define and understand water use and conservation issues: While all respondents aged 50 and above placed computer models into the 6th to 9th rank, the ones between age 30 and 40 have sometimes given ranks between 2nd and 5th to this type of media. However, the trend is still clear for all age groups: computer models and ICT currently play a low key role in information dissemination.

In a predominantly oral culture, these results were to be expected and there seems to be only limited way past oral information dissemination, at least in order to reach a broader public at the grass-root level. The question is to which extent mediators (chiefs, CBOs, teachers, priests, etc.) can be targeted with other means of information dissemination. And as a corollary to this ques-

tion: Which mediators to target at all? Figure 6 below shows which mediators are currently consulted by respondents in order to inform the community about the activities of the organisation they represent. CBOs, schools and churches seem to be favoured pathways to reach communities. WUA have not been listed at all, as they probably still lack the adequate capacity to take over the role of mediators, unless their absence in the figure below is yet another indication of their current lack of roots in the local communities due to their young age.

Figure 6: Mediators through which activities of organisations are communicated to the community



Source: Field Data, 2003

7.3.3 Conclusions

Pertaining to the current situation, one can state that stakeholders do require information on water related issues in order to carry out various activities; that they access part of this information mainly through authorities and their own communities; that there is a range of information that they could make use of, but is not currently available to them. One can further state that stakeholders find the currently available information useful (164 out of 208 valid answers), but are generally dissatisfied with the way this information is communicated to them (129 out of 209 valid answers). They do wish to have timely and easier access to more easily understandable information. Finally, respondents prefer to rely on traditional oral ways of communication, or on visually prepared media (photography, cinematography) to access information.

This sets the stage upon which the information platform's contents and structure will take shape. Not all the stakeholders' preferences will be applicable as this happens, due to the nature of the tools to be used. Especially the information dissemination part will be quite different from what people are used to at the moment, at least in the primary relationship between the information platform and mediators who will access it. The challenge will be to provide guidance to those selected mediators in accessing, understanding and further disseminating the information to a broader public. In this context, one question remains unanswered: The survey does not provide

information on the motivation resource persons and institutions might have in becoming mediators between a future Water Information Platform and the communities at large. The question about the incentives that have to be provided to potential mediators in order to stand a realistic chance of building up a sustainable information dissemination network was not tackled in the present survey; an omission, which will have to be bridged through other means of investigation. As a corollary to this question, is the one about the available personal capacity and the available financial resources a particular institution has at hand in order to play a mediator role.

Though a comprehensive answer to the above questions will be formulated at a later date, it is worth noting, that the aspect of incentives places the **WUA** – which, according to the survey results, seem to play second fiddle in several respects – in a more prominent position. According to expert knowledge, these institutions have a genuine wish to improve water use and conservation issues in the sub-catchments they are in charge of. If information on the same can facilitate this endeavour, their motivation in becoming mediators between a future water information platform and the communities might provide at least partial guarantee for the sustainability of the above mentioned information dissemination network.

Bearing this in mind and in light of the respondents' indications, the following **corner stones of the future water information platform** can be suggested:

1. The platform will focus on information pertaining to water availability and potentials, water consumption and catchment protection. In this, it will highlight the interdependence of all parts of the Upper Ewaso Ngiro Basin and the possible consequences of actions taken in one location on other locations down the river.
2. This information will be availed as maps and sub-catchment directories in the first place to “mediators”, who can make direct use of it in the frame of their activities, or can relay it to a broader community.
3. The mediators to be selected in first line as direct beneficiaries will be: Water User Associations, District and Local Authorities, Schools, NGOs and Community Based Organisations. It is believed that these institutions will be in a position to convey the information, or part of it to the communities when need arises.

As ICT is not well known among the mediators and even less in the communities, and was furthermore not identified as an appropriate way to disseminate information, serious attention will have to be given to the following:

4. In respect to the information contents, the platform will have to focus on simple information elements, or information units that have a direct relation to processes directly observable in the environment. An appropriate way to cut information into digestible pieces, which will nevertheless not lose the basin-wide focus, will be sought.
5. In respect to information preparation, the platform will have to be as user-friendly as possible in order to help potential users to overcome their initial inhibition towards modern ICT.
6. Finally, capacity building will have to be provided to selected mediators in order to promote the use of the platform. In this respect, it is not yet clear to which degree users will access modelling capabilities on their own and to which extent this part of the information preparation will be provided by permanent staff members.

7.4 Achievements and challenges of Water User Associations (WUA)

The part of the study described so far was common to all respondents. What follows has been submitted to representatives of WUA only.

7.4.1 The changing policy and legislative environment and emerging new water resources management structures

Reforms in the water sector have been going on in the last five years. These reforms have focused on institutional arrangements for water resources management and have emphasised on reviewing the entire water policy framework, re-organising the ministry structures and repealing the Water Act in order to make them responsive to the highly dynamic arena of water resources in the country.

Through these reforms, the role of the government has been shifted from that of direct service provision to that of regulatory and enabling functions. This policy shift has the deliberate aim to promote integrated approaches and to support the private sector as well as community participation in the management of water resources in the country (*GoK, 1999: Sessional Paper No. 1 of 1999 pg. 42, 4.1.3*). As a consequence, the Water Act CAP 372 was repealed in order to create new institutional structures that will oversee the implementation of the outcome responsibilities. The new Water Act 2002, therefore, creates an autonomous institutional framework that separates water resources management from service delivery in order to ensure sustainable management of water resources in the country. The reforms based on the global principles of decentralisation, participation, and sustainability of water resources (GoK 2002a) now provides for a Ministry of Water and Irrigation structured into three main functions (GoK 2002a, 2002b, 2002c):

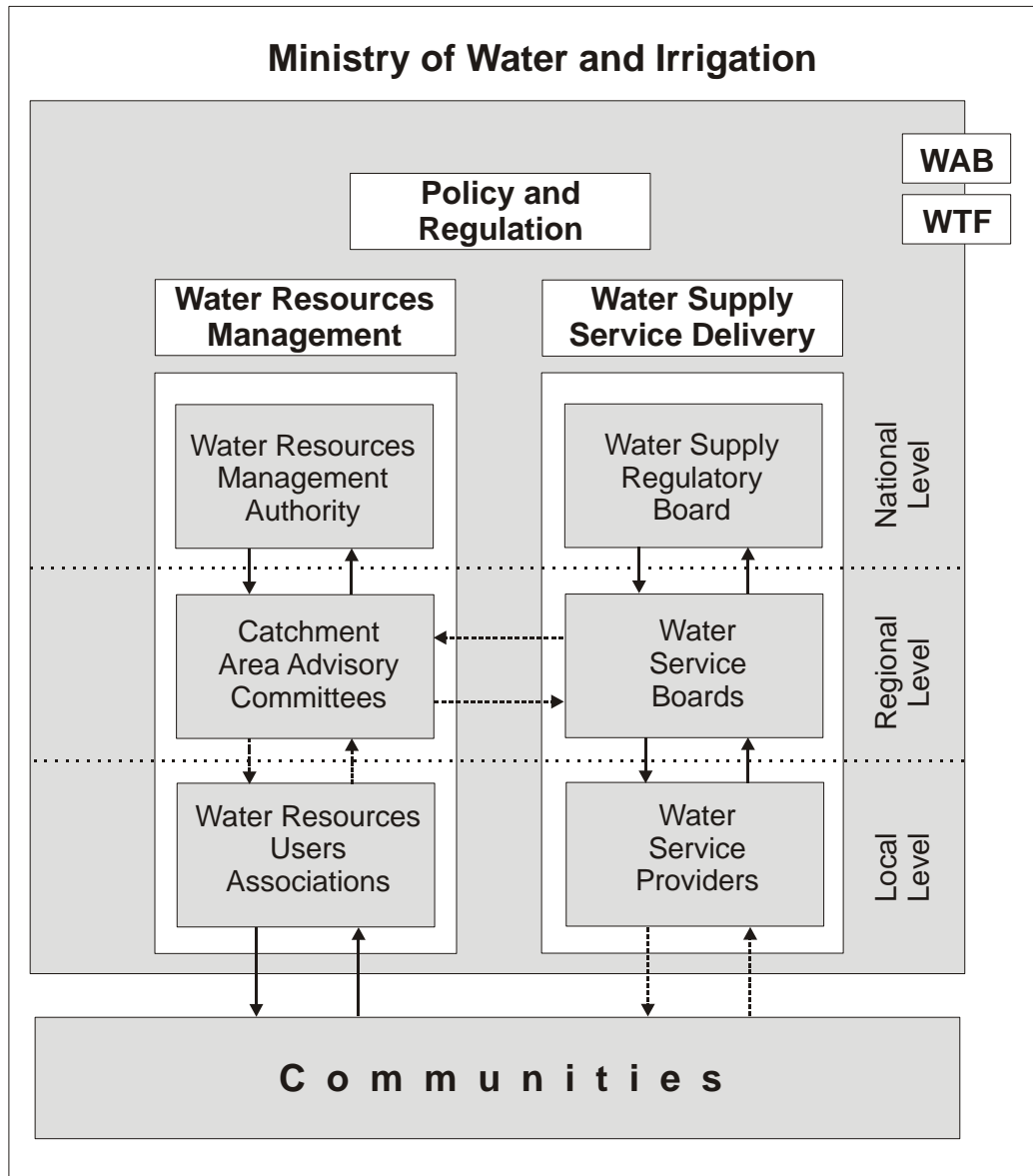
- 1 Water Resources Management
- 2 Water Supply and Sanitation Service Delivery
- 3 Policy Formulation and Regulation

The Water Resources Management function will be the responsibility of a newly established Water Resources Management Authority (WRMA) whose functions are decentralised to the catchment and sub-catchment levels through the Catchment Area Advisory Committees (CAACs) and Water Resources Users Association (WRUAs). The appointment and the functions of the CAAC are articulated in the Water Act 2002, while those for the WRUA are supposed to be based on the provisions contained in what the Act describes as *the Catchment Management Strategy* to be prepared by the Water Resources Management Authority in consultation with the CAACs (*ibid*).

On the other hand, the water supply and sanitation service delivery will be executed under the responsibility of the Water Services Regulatory Board (WSRB), the main functions of which are licensing, setting of standards for, and monitoring the provision of water services to the consumers, among others. The WSRB will do this by delegating to the Water Service Providers (WSP) whose formation and functioning are outlined in the Act. The Act is, however, silent on how the latter relates with the consumers (communities) although the WSRB is supposed to establish procedures for handling complaints made by consumers against those licensed as service providers (*ibid*).

In support for these new structures are the Water Appeal Board (WAB) and the Water Trust Fund (WTF). The WAB will hear and determine any appeal or disputes from water users. The WTF will on the other hand assist in financing the provision of water resources to areas without adequate water services (see Figure 7).

Figure 7: Institutional structures of the Ministry of Water and Irrigation



Source: GoK 2002c

7.4.2 The position of WUAs in the legislation for water resources management

Water Users Associations (WUAs) are defined as non-profit making organisations initiated and managed by a group of water users in a sub-catchment regardless of the type of farms involved. Water users here refer to individual farmers, water projects, corporate institutions and enterprises (large scale ranches, horticultural farms, municipalities, schools, international hotel, etc.) and include the wildlife (see also IWMI/ SICWC 2003). The Water Act 2002 recognises River Water Users Associations (through the Water Resources User Associations (WRUAs)) as the grassroots institutions for conflict resolutions and community mobilisation towards better and sustainable water resource management in their respective catchments areas (GoK 2002c: *Water Act 2002 Sec 15(5)*). The River Water Users Associations (RWUAs) in Mt. Kenya region commenced as part of the larger strategy for water use and management, under the water awareness creation campaign initiative, in the mid 90s (long before the repeal of the water act). The subsequent years saw the gradual growth (in numbers) of the WUAs, as they gained prominence as one of the most effective ways of enhancing water users (community) participation in water resources management, especially in conflict resolution as water became scarce and competition among users stiffer. As more WUAs became established and differences in performance between them started to show, fundamental questions about their effectiveness and long-term sustainability became obvious.

This necessitated a study to help answer these questions. It was hoped that, although their period of operation was relatively short, the emerging issues would provide useful lessons to guide the formation and operation of new WUAs in the catchment and elsewhere in the country.

7.4.3 The role of WUAs in conflict resolution and resource management

The overall objective of this part of the study was to examine the effectiveness and long-term sustainability of WUAs as grassroots structures for conflict resolution and water resources management. The study specifically sought to establish:

1. the number of WUAs so far established
2. the trigger factors for the formation of WUAs
3. the role of large scale irrigation schemes in the formation and functioning of the WUAs
4. specific approaches by the WUAs in conflict resolutions
5. nature of conflicts so far addressed by the WUAs
6. other water management related activities undertaken by the WUAs
7. the untapped potential of the WUAs
8. constraints limiting the optimal functioning of the WUAs

The study established that there were 13 WUAs in the Upper Ewaso Ngiro Basin; and that although the establishment of the present WUAs was as a result of the sensitisation campaign conducted during the Water Awareness Creation Campaign in the mid 1990s, there were other trigger factors responsible for their actualisation. Among the major reasons for the formation of the WUAs are:

1. Persistent water shortages and conflicts during the dry spell (9 of 13 WUAs = 69%)
2. Catchment degradation (31%)
3. Need for a platform for local (financial) resources mobilisation in order to support community water projects (15%)
4. The desire to respond to requirements by the new water Act for every catchment area to form Water Resources Users Associations (15%)

Other reasons mentioned by 46% of the WUAs include water politics; water pollution; and the establishment of a large-scale irrigation scheme in the catchment area and therefore the need to create a platform for negotiation.

Besides these primary trigger factors, the study established a strong influence by the large-scale horticultural farms operating in many of the catchment areas, many of whom are actually members of the WUAs. Seventy percent of the WUAs were formed in conjunction with the large-scale horticultural farms. From these, 88 percent received, and have continued to receive, financial, logistical and technical support from the horticultural farms for their establishment and continued functioning. And, although the other 22 percent did not receive any direct support they benefited indirectly from the participation of the horticultural farms in the activities of the WUAs. They were actually negotiating for technical and logistical support from the horticultural farms at the time of this study. Table 5 summarises the nature of support different WUAs received from the horticultural farms during and after establishment.

Table 5: The role of horticultural farms in the formation and functioning of WUAs

Name of WUA	Horticultural farms in catchment area	Horticultural farms members of the WUA	Nature of support given by horticultural farms		Remarks by the respondent
			During formation	After formation	
Burguret River	2	2	Initiated and convened the first meeting with the authorities	Provide transport, assist in data collection and dissemination	WUA could not have taken off without the support from horticultural farms
Isiolo River	0	0	None	None	None
Mia Moja	0	0	None	None	None
Mt. Kenya East (Timau) River	Not specified	4	No participation	No participation	The WUA could perform better if the horticultural farms would support it
Nanyuki River	0	0	None	None	None
Naro Moru River	2	2	Gave moral support	None	None
Ngare Nything/ Sirgon	Not specified	3	Founder members; provided financial and logistics support	Financial and logistic support; office space, documentation and leadership	The WUA would not function without their support
Ngusishi River	8	8	Initiated idea and conducted feasibility study; helped to register and provided finances & logistics support	Pays project manager, provides office space & motor bike	WUA could not function without them because ordinary members (farmers) cannot afford to finance its running.
Ontulili River	3	3	One of them facilitated the initial meetings and management support	Assist in Coordination of WUA	Could not work without their support.
Ewaso Narok River	1	0	None	None	None
Likii River	2	2	Financial support, fixing legal protocols, facilitated initial meetings and mobilised other stakeholders	Financial & managerial support	Could not work without them because of financial constraints and lack of managerial capacity. Dominates heavily in the running of the WUA
Ngare Ndare River	4	4	Financial and logistic support, organised seminars with experts, organised meetings with members and keeps records	Financial and management support	WUA could not work without them because other members could not raise enough money to finance operations
Rongai River	0	0	None	None	None

Source: Field data 2003

7.4.4 Sources and nature of conflicts

Water use conflicts may occur between different users at different levels. The nature of these conflicts can be understood by examining the kind of complaints registered by different water users at their respective WUA. These would also help to reveal the symptomatic manifestation of the conflicts so that they can be addressed in earnest before they become explosive. This study revealed that conflicts experienced in the area are triggered by:

1. Water shortage and increased competition among users leading to manipulation and/or destruction of river courses, water intakes, furrows, or pipes (92%)
2. Illegal and/or over abstraction of river water as individual users compete to realise unmet needs and expectations (54%)
3. Failure by some water users to accept to share equitably the little available water (38%)
4. Water pollution from activities upstream such as car washing in urban centres (23%)
5. Catchment destruction through felling of trees, cultivation along river banks and quarrying in riparian neighbourhoods (23%)
6. Other factors such as biased or failed reconciliatory intervention by the local administration and leadership, and lack of water situation information to guide the negotiation processes between conflicting parties (31%)

Conflicts arising from any one or a combination of these problems can occur between different user groups at different levels: upstream versus downstream water users; small-scale versus large-scale irrigators; agro-pastoralists versus pastoralists; users versus authorities; users versus environmentalists; and among users at project level, (Kiteme & Gikonyo, 2002; Mujwahuzi 2001).

Apart from the above listed conflicts that are openly expressed and are normally brought to the WUA for attention, a whole range of other conflicts remain latent and are not debated. Some of these conflicts loom within the WUA, between individual members, or between members and officials of the WUA committees, while others loom between the WUA and external players. Most of these conflicts concern mistrust within the WUA (between ordinary and executive members) resulting from financial mismanagement and theft of materials (e.g. pipes), and from poor leadership that often results in biased judgement and therefore wrong decision against some WUA members. This affects the general participation of the affected members.

7.4.5 Conflicts resolution approaches by the WUAs

The primary objective for the formation of the WUAs is to address the kind of conflicts elaborated above. The effectiveness of these WUAs therefore has to be measured by examining how they went about resolving such conflicts, how many they had by then addressed and how successful they had been in doing so. This section looks at these issues and particularly the main approaches by the WUAs in managing the emerging conflicts in the region.

The main conflict resolution approach involved arbitration and negotiation between the conflicting users through meetings during which appropriate and acceptable measures are agreed upon (used by 10 of the 13 WUAs (77%)). However, conflicts with gravity beyond the ability of the WUAs in the affected catchment area(s) are resolved in collaboration with relevant government departments (38%) (Kiteme and Gikonyo 2002). Additionally, some of the WUAs (31%) occasionally organise awareness creation campaigns to sensitise users on prevailing water conditions in the catchment area at the time, and the need to observe good water use practices. Furthermore, a similar percentage (23%) also undertakes to regulate existing and new abstractions through regular inspection tours (by the executive committee) and river policing by the Water Situation Monitors who report to the executive committees, on a daily basis, any new developments within their designated river segments that might require immediate attention. New water applicants are required to consult the WUAs before they can submit their application to the water office. The executive committee of the concerned WUAs can, according to by-laws, deny water to any new applicant who may obtain water abstraction permit from the Water Office without first consulting them (ibid).

Regarding the actual involvement in conflict resolution, the study revealed that 70% of the WUAs handled over 52 cases in a span of not more than five years. The remaining 30 per cent did not have cases with the potential to translate into a conflict. It is ironical that two of these WUAs had not addressed any type of conflict yet they were formed as a result of persistent water use conflicts in their catchment area. It is however possible that the operations of these WUAs had not fully picked up owing to serious financial constraints and organisational problems as the respective executive committees indicated. Table 6 gives an overview of the number and nature of cases dealt with by different WUAs, including the level of accomplishment in each case¹. From the information presented in the table, 87 percent of the cases were successfully addressed, and only 13 percent were pending further attention from either the concerned Executive Committees (82%) or a Court of Law (28%).

Table 6: Overview of the number and nature of cases dealt with by different WUAs

Name	Age in years	No. of cases	Nature of cases	Accomplishments
Burguret River	4	5	Over-abstraction, blocking of furrows, pollution, destruction of abstractions, irrigation issues	Four cases were addressed; one is pending in court
Isiolo River	1	3	Wasteful water use; cutting of indigenous trees	All are pending with the executive committee
Mia Moja Water Association	13	5	Illegal abstractions, blocking of canals, gravity levelling, and interference by non-members	One case is pending with the executive committee
Mt Kenya East (Timau)	1	4	Diversion of water by individual water users; destruction by other users	One case is pending in court
Nanyuki River	2	?	Water shortage and scarcity problems during the dry spell	All cases successfully done
Naro Moru River	1	3	Downstream water shortage; members felling trees along the river; illegal car wash contaminating the river	All cases successfully done
Ngare Nything/Sirgon	6	10	Problems of pipe sizes by different user members; water shortages	One case is pending with the executive committee
Ngusishi Rivers	5	20	Water shortages (water rationing programme, timing of abstractions among different user groups; issuing water use guidelines), pollution, splinter groups, and destruction of vegetation cover	All cases successfully done
Ontulili River	1	2	Over-abstraction leading to water shortages, and catchment destruction	All cases successfully done
Ewaso Narok	1	None		
Likii River	1	None		
Ngare Ndare	2	None		
Rongai River	1	None		
9 WUAs		Over 52 cases		87% of the problems successfully addressed

Source: Field data

¹ It is important to note that the WUA shown in the table as 13 years old started as an irrigation scheme and only started to address conflict management issues in the last five years. Prior to that, the WUA focused on improving food security through irrigation production.

7.4.6 Involvement in other water resources management activities

In addition to conflict resolution, 69% of the WUAs engaged (and 23% planned to) in other activities aimed at enhancing sustainable management of water resources in their respective catchment areas. The main areas of focus included:

1. Catchment protection: soil and water conservation within the catchment (23%)
2. Environmental education and awareness creation (54%)
3. Water conservation (46%)
4. Others: HIV / AIDS campaigns, biodiversity conservation, food security improvement, and marketing of farm produce (46%)

While the only catchment protection activity undertaken was tree planting, water conservation activities involved promoting better irrigation practices like drip irrigation, rainwater harvesting, and improved river water storage.

7.4.7 Challenges and Constraints limiting the optimal operation of the RWUAs

Although in operation for a relatively short time the WUAs in the Mt. Kenya region faced numerous constraints that hindered realisation of their full potentials. These included:

1. Financial constraints which was experienced by almost all the WUAs with ongoing activities during the time of study (83%)
2. Lack of professional, technical and logistical support from the water authorities (31%)
3. Lack of suitable means of transport and communication to coordinate the WUAs activities in expansive and poorly road networked catchment areas (31%)
4. Lack of qualified management staff to run the affairs of the WUAs (31%)
5. Lack of legislative backing to enforce by-laws and other relevant legislative requirements

In addition, a large number (62%) of the WUAs experienced constraints that were unique within their own environment of operation: Time constraints as many of the officials were engaged in other personal work that in most cases get first priority thereby compromising total commitment to the WUA work; insecurity (threat by wildlife) in some of the areas; delays in the WUAs registration process; internal politics and wrangling which threatened their very existence; lack of office to transact WUA business; inadequate supply of seedlings and lack of a suitable place for raising them; and people's attitudes towards conservation matters.

7.4.8 Achievements

In spite of these challenges and constraints, the operational WUAs have managed to make achievements that have impacted greatly on the water situation in the concerned catchment areas. Key achievements highlighted by the WUAs are:

1. Reduced, or minimised water use conflicts (62%)
2. Catchment rehabilitation (38%)
3. Increased awareness about the water situation (23%)
4. Improved water flow such that people can get water throughout the year

Others (23%) had different assessments of their achievements: In some cases the mere fact of successfully bringing different water user groups together to form the WUA; the rapid growth in membership by some of the WUAs (one increased from a small 8 members group to a strong 300 members group in five years time); and improved food security were seen as major achievements.

7.4.9 Lessons Learnt and Conclusion

Although this study was conducted at a time when many of the WUAs had not been in operation for long enough (70 per cent were below 2 years old), the results nevertheless provide some potentially important lessons that could be useful for the future of the WUAs.

That the large-scale horticultural farms played an important role in the formation and ongoing activities of most WUAs is no doubt. This means that a minimum financial resource base is a prerequisite for a successful formation and functioning of any WUA. Like any other organisation, WUAs would need this money to finance their initial and subsequent operations costs and especially costs arising from the basic management obligations by the executive committees: Registration costs, meetings, transport, stationary, etc. It is therefore important that adequate financial resources are mobilised from the WUA membership to finance the initial formation costs. More important is also the need to develop a fund raising strategy to guarantee long-term financial availability.

In the short time they have been in operation, the WUAs in the Upper Ewaso Ngiro Basin have made a remarkable contribution, in the areas they operate in, in raising general awareness about water resources situation, reducing water use conflicts and wasteful water utilisation, and regulating river flow to ensure availability of water to all especially during the dry spells. Although there is no quantitative data to show the actual amount of water finding its way to the downstream users as a result of the WUAs interventions, the testimony by the water users attest to this. These rather impressive and encouraging results of short-term achievements strongly point to the huge potential of the WUAs as grassroots institutions for water resources management in the country.

While the WUAs have tried to do their best in addressing water use conflicts in their respective catchment areas, the broad agenda of water resources management has not been fully exhausted and energies invested to their optimal level. This is so especially in areas such as environmental education and awareness, water pollution control and catchment protection. Although majority of the WUAs had gone into this direction by engaging in activities such as afforestation, better irrigation practices and rainwater harvesting, their full potential remains untapped the limitations highlighted notwithstanding. If properly managed and adequately supported, the WUAs could finally translate in important CBOs through which other national goals such as poverty reduction, food security improvement and rural development could be realised.

The performance of the WUAs would greatly improve if some of the major challenges and constraints could be immediately addressed. It emerges from the study that initial and continued professional, technical and logistical support are critical for the successful operations by the WUAs; furthermore, some minimum legislative powers are necessary as a legal backup to law enforcement regarding water use at the community level. The by-laws and the constitutions presently at use are not effective because of lack of this legislative backing. The government, having recognised the role of WUAs in water resources management, should, therefore, streamline and step-up its facilitative role, at formation and operations levels, which are an important support, required for a successful functioning of the WUAs.

Internal wrangling resulting in conflicts that are never expressed raise fundamental questions and doubts over the manner of leadership and governance by the executive committees, and indeed threaten the continued existence of the affected WUAs. Reported cases of financial mismanagement, favouritism in water allocation, and theft of WUA materials is a sure recipe for a crumbling organisation: The longer such internal conflicts remain latent and unattended the bigger the danger for the affected WUA to disintegrate and cease to be. Good governance and quality leadership must therefore be guaranteed if the WUA will be sustainable.

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Annex: Maps

Upper Ewaso Ngiro Basin
Water Management Information Platform

Map 1: Survey Areas for Research Teams

Survey areas approximately outlined in yellow cover areas located in the vicinity of rivers and major roads.

Map Sources

Hillshade and Digital Elevation Model (DEM) prepared by the Centre for Development and Environment, University of Berne, Switzerland.

All linear features from the Centre for Training and integrated Research in ASAL Development (CETRAD). Road and river buffers (blue and green areas) calculated from those linear features.

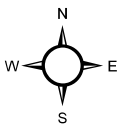
Administrative boundaries not authoritative. Attribute information of sub-locations joined to survey database.

Linear Features

- Settlements
- Murram Roads
- Tarmac Roads
- Main Rivers

Delineation of Survey Areas

- Areas within 2 km from a River
- Areas within 2 km from a River and a Road
- Survey Areas

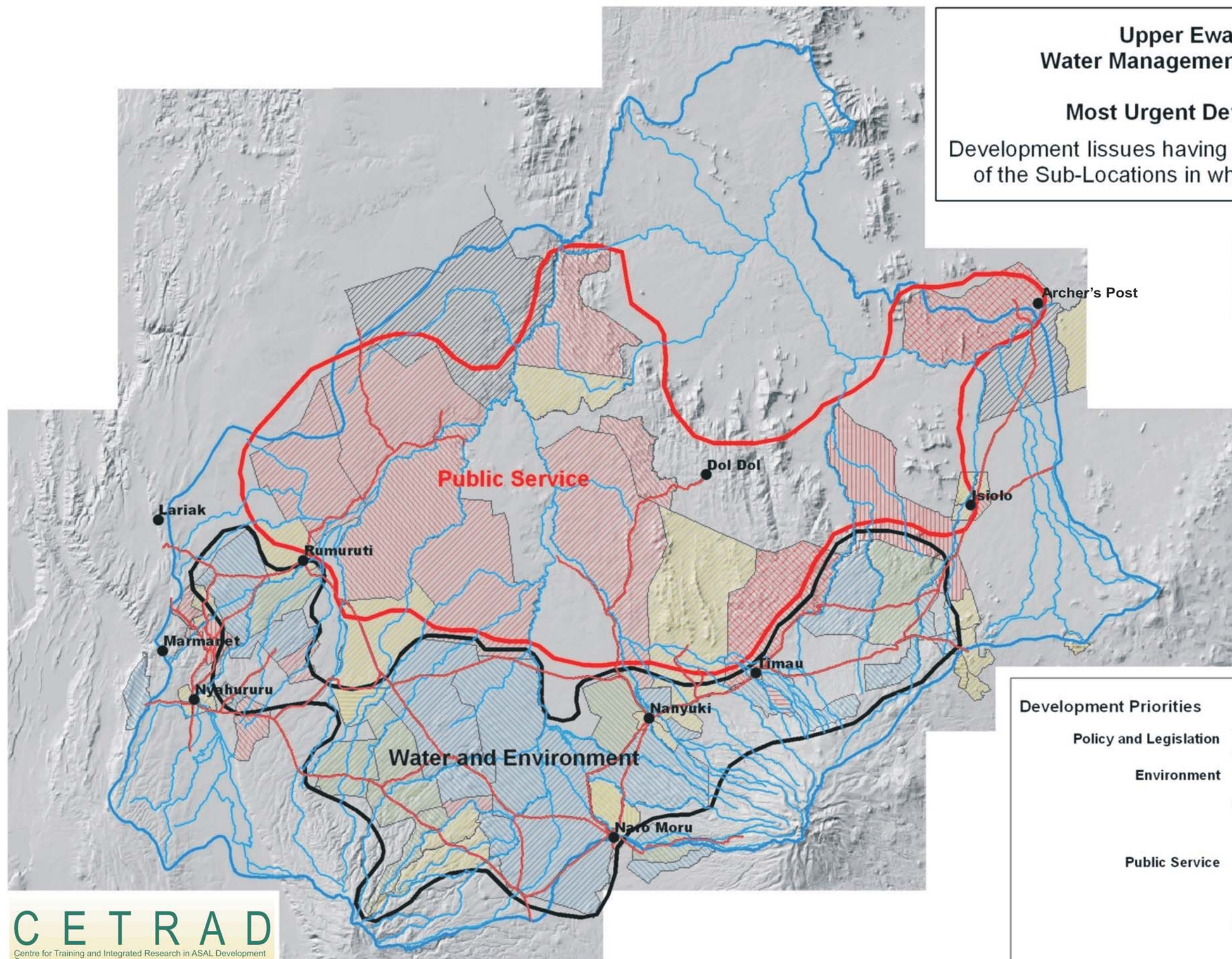


0 25 50 Kilometers

Upper Ewaso Ngiro Basin Water Management Information Platform

Most Urgent Development Priorities

Development issues having obtained the highest rank in each of the Sub-Locations in which Interviews were carried out



Map Sources

Hillshade derived from Digital Elevation Model prepared by the Centre for Development and Environment, University of Berne, Switzerland.

All linear features from the Centre for Training and integrated Research in ASAL Development (CETRAD).

Administrative boundaries not authoritative. Attribute information of sub-locations joined to survey database.

Linear Features

- Upper Ewaso Ngiro Basin Boundary
- Major rivers
- Major roads
- Settlements

The two areas delineated in red and black do not correspond to any real existing physical entities. They are an attempt at approximately clustering the development priorities according to certain categories.

Development Priorities

Policy and Legislation

Environment

Public Service

Economy

Water Use and Conservation

- Land Tenure
- Human - Wildlife Conflicts
- Forest Conservation
- Education
- Infrastructure
- Health
- Crime and Security
- Access to Markets
- Economic Situation
- Poverty
- Unemployment
- Food Security
- Population Pressure
- Water Conservation
- Water Use

CETRAD

Centre for Training and Integrated Research in ASAL Development
P.O. Box 144, Nanyuki, Kenya
Tel: +254 (0)82 31 328
cetrad@cetrad.org

0 25 50 75 100 Kilometers